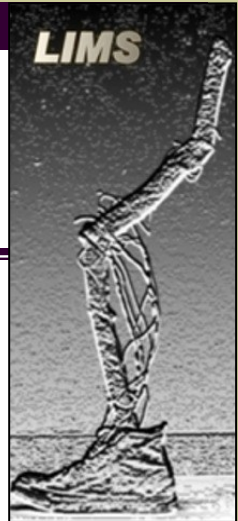


La Crosse Institute For Movement Science (LIMS)

Thomas Kernozek, PhD, FACSM, Director



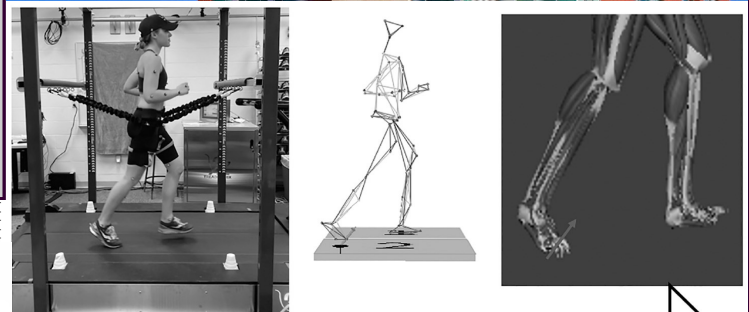
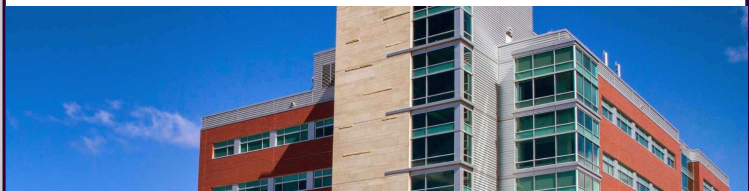
The Institute was created in 2005 at the University of Wisconsin—La Crosse in the Department of Health Professions, Physical Therapy Program. Dr. Tom Kernozek is the founding director of LIMS.

LIMS brings together scientists and clinicians from various disciplines seeking applied knowledge related to human movement, factors related to injury, and in the foundations of therapeutic exercise used in the treatment and rehabilitation of injury.

Annually over 40 students from graduate and undergraduate programs from the UW-L campus are involved in laboratory research from Physical Therapy, Physics, Exercise and Sport Science, and Biology. High-technology funding from the State of Wisconsin supports Physics Biomedical student internships in the laboratory. Gundersen Medical Foundation annually supports Sports Medicine researcher Nate Vannatta as a clinical research collaborator. We also have a research partnership with Mayo Clinic (La Crosse).

Due to the many publications from the clinical biomechanics laboratory, LIMS has developed a national/international reputation.

The Health Science Center is home to the La Crosse Medical Health Science Consortium, a unique partnership between Gundersen Health System, Mayo Clinic Healthcare La Crosse, Western Technical College and Viterbo University. The building serves as the core of many educational, community partnerships/programs, and research activities. LIMS and the Physical Therapy program has grown along with the HSC into one of central research hubs at UW-La Crosse. Faculty and student research outcomes have distinguished UWL and the doctoral program in Physical Therapy Program.



Kinematics and Kinetics on Treadmill Link Segment Model Musculoskeletal Model
Adapted from Pohlman et al (2023) Effects of Body Weight Support in Running on Achilles Tendon Loading. IJSM

LIMS welcomes Shane Murphy!



Shane Murphy recently joined UWL as an assistant professor in the Department of Health Professions, within the Physical Therapy graduate program. Shane is coming from the University of Montana, where he directed the Clinical Biomechanics & Athletic Training Research Laboratory and taught within the Athletic Training graduate program. His expertise is in lower extremity biomechanics with an emphasis on gait and posture as they relate to physical activity and sport. Specifically, Shane has worked to translate laboratory measurements to real-world settings by utilizing a combination of wearable and portable technologies. The combination of traditional and exploratory measures within sport has been valuable to understanding the cumulative workload that individuals may experience while being active.



Dr. Murphy received his BS in athletic training at the University of Wisconsin – Eau Claire ('14), before completing his MS in biomechanics at Indiana University ('16). His dissertation at Northern Colorado University ('19) was on asymmetrical walking and running, simulating the metabolic cost of having a unilateral amputation of the lower extremity. His research has included several clinical populations, including those with amputations, those suffering from chemotherapy induced peripheral neuropathy, and collegiate athletes with ACL reconstruction, lateral ankle sprains and running related overuse injuries.

Looking forward, Shane hopes to explore noninvasive measures in clinical and active populations, especially as it relates to the onset of chronic and overuse pathologies. His primary interest is to better understand how the body responds to exercise, with a particular interest in neuromuscular adaptations. Future areas of research look to translate findings in collegiate athletes to the general population by utilizing measures that both indicate performance and disease.

LIMS Scientists

- Hanni Cowley**, DPT, Clinical Partner (Health Professions)
- Patrick Grabowski**, PT, PhD, OCS, CSCS, Motor Control/Biomechanics, (Health Professions)
- John Greany**, PT, PhD, Exercise Physiologist, (Health Professions)
- Naghmeh Gheidj**, PhD, Biomechanist, (Health Professions)
- Becky Heinert**, MSPT, SCS, (Winona State University)
- Tom Kernozek**, PhD, FACSM, Biomechanist, (Health Professions)
- Shane Murphy**, ATC, PhD, Motor Control/Biomechanics (Health Professions)
- Drew Rutherford**, MS, Laboratory Manager/Engineer (Health Professions)
- Nate Vannatta**, DPT, SCS, (Gundersen Sports Medicine)
- Robert Ragan**, PhD, Computational Physicist (Physics)
- Kanikkai "Steni" Sakiriyas**, PT, DSc, Clinical Biomechanics (Health Professions)



Recently Published or In Press Research (2022-2023)

Castle KB, Kernozek TW, *Warren E*. Two-dimensional versus three-dimensional measurement of infant cervical active motion. *Physiother Theory Pract.* 2022 Jun;38(6):805-817. doi: 10.1080/09593985.2020.1790069. Epub 2020 Jul 6. PMID: 32627624.

De Starkey KR, Groth AM, Thyssen RR, Kernozek TW. Added mass increases Achilles tendon stress in female runners. *Foot (Edinb).* 2023 Mar 25;56:102028. doi: 10.1016/j.foot.2023.102028. Epub ahead of print. PMID: 37011454.

Ertman B, Dade R, Vannatta CN, Kernozek TW. Offloading Effects on Impact Forces and Patellofemoral Joint Loading During Running in Females. *Gait Posture.* 2022 Mar;93:212-217. doi: 10.1016/j.gaitpost.2022.02.013. Epub 2022 Feb 16. PMID: 35183838.

Ertman B, Klaeser M, Voie L, Gheidi N, Vannatta CN, Rutherford D, Kernozek TW. Alterations in Achilles tendon stress and strain across a range of running velocities. *J Sports Sci.* 2023 Mar;41(5):495-501. doi: 10.1080/02640414.2023.2225015. Epub 2023 Jun 14. PMID: 37314093.

Jacobson L, Vannatta CN, Schuman C, Kernozek TW. An Updated Model Does Not Reveal Sex Differences in Patellofemoral Joint Stress during Running. *Int J Sports Phys Ther.* 2022 Dec 2;17(7):1290-1297. doi: 10.26603/001c.39608. PMID: 36518831; PMCID: PMC9718697.

Kiminski R, Williams C, Heinert B, Mills O, Cluppert K, Rutherford D, Kernozek T. Transfer of post-trial feedback on impacts during drop landings in female athletes. *Sports Biomech.* 2022 Aug 30:1-15. doi: 10.1080/14763141.2022.2114931. Epub ahead of print. PMID: 36039917.

Massie C, Redman K, Casper S, Wissink D, Dade R, Lowery A, Ross K, Sackiriyas KSB, Almonroeder TG. The Effects of Cadence Manipulation on Joint Kinetic Patterns and Stride-to-Stride Kinetic Variability in Female Runners. *J Appl Biomech.* 2022 Sep 20;38(6):373-381. doi: 10.1123/jab.2022-0077. PMID: 36126939.

Pohlman C, Pardee A, Friedman M, Rutherford D, Vannatta CN, Kernozek TW. Effects of Body Weight Support in Running on Achilles Tendon Loading. *Int J Sports Med.* 2023 Jun 19. doi: 10.1055/a-2113-1026. Epub ahead of print. PMID: 37336504.

Sackiriyas, S., Heinert, B., Rutherford, D., Fritz, G., Kernozek, T.W. Concurrent Force Feedback on Load Symmetry in Total Knee Arthroplasty. *Int J Sports Phys Ther.* Published online August 1, 2023:856-863. doi:10.26603/001c.84312

Vannatta CN, *Blackman T*, Kernozek TW. Kinematic and muscle force asymmetry in healthy runners: How do different methods measure up? *Gait Posture.* 2023 May 12;103:159-165. doi: 10.1016/j.gaitpost.2023.05.010. Epub ahead of print. PMID: 37187155.

VanZile A, *Driessen M*, Grabowski P, Cowley H, Almonroeder T. Deficits in Dynamic Balance and Hop Performance Following ACL Reconstruction Are Not Dependent on Meniscal Injury History. *Int J Sports Phys Ther.* 2022 Dec 1;17(7):1298-1306. doi: 10.26603/001c.55542. PMID: 36518839; PMCID: PMC9718728.

Waite L, Stewart M, Sackiriyas KSB, Jayawickrema J, Almonroeder TG. Female Athletes Exhibit Greater Trial-to-Trial Coordination Variability When Provided with Instructions Promoting an External Focus. *J Mot Behav.* 2022;54(6):686-693. doi: 10.1080/00222895.2022.2067517. Epub 2022 Apr 27. PMID: 35477341.

Zavala P, Vannatta CN, Kernozek TW, Rutherford DN. Dynamic postural control in injured collegiate cross-country runners is not associated with running-related injury. *Gait Posture.* 2023 Jun 9;104:77-82. doi: 10.1016/j.gaitpost.2023.06.002. Epub ahead of print. PMID: 37343398.

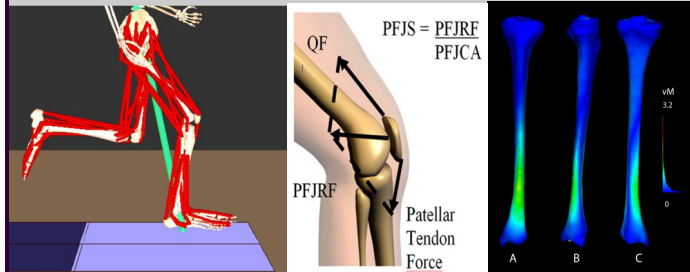
****UWL student or resident contributors are in *italics*****

***We measure movement performance!***

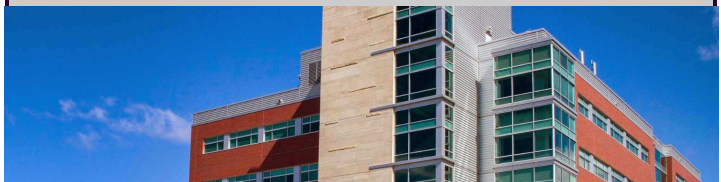
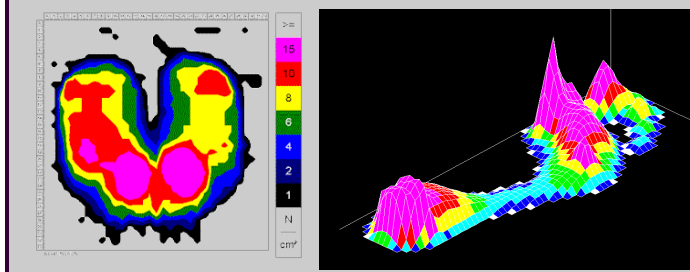
Our laboratories have sophisticated equipment that measure motion, impact forces, pressures on the feet or seat, muscle activation, energy cost, respiration and heart rate, or imaging of tendons or other soft tissues.

These data can be used to determine the loading on joints and muscles to give insight to how and why injuries may occur or for the improvement of performance to keep you active.

Musculoskeletal models are used to examine loading on bone, joints, ligaments, and tendons (shown below).



Loading in seating or during walking or running (shown below). Hotter colors depict higher loading in these anatomical areas.

**For more information contact:**

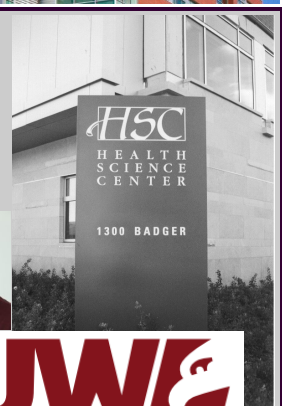
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LA CROSSE **UWL**



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LIMS on your
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